

Molecular anions in protostars, prestellar cores and dark clouds

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From our recent survey work using the Green Bank Telescope, microwave emission lines from the hydrocarbon anion C_6H^- and its parent neutral C6H have been detected in six new sources. Using HC_3N $J = 10-9$ emission maps, we targeted the most carbon-chain-rich sources for our anion survey, which included the low-mass Class 0 protostar L1251A-IRS3, the prestellar cores L1389-SMM1 and L1512, and the interstellar clouds L1172A, TMC-1C and L1495B. Derived $[C_6H^-]/[C_6H]$ anion-to-neutral ratios are $\sim 1-10\%$. The greatest C_6H^- column densities are found in the quiescent clouds TMC-1C and L1495B, but the anion-to-neutral ratios are greatest in the prestellar cores and protostars. These results are interpreted in terms of the physical and chemical properties of the sources, and the implications for molecular cloud chemistry are discussed.